

# Survey of Market Absorption of New Multifamily Units

## *ANNUAL 2016 – ABSORPTIONS* *(Apartments Completed in 2015)*

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Questions regarding these data, or for further information on the **Survey of Market Absorption of New Multifamily Units** data, may be directed to the **Social, Economic, and Housing Statistics Division (SEHSD)**, Telephone 301-763-3199 or Contact George Boyd at [george.t.boyd@census.gov](mailto:george.t.boyd@census.gov).

## INTRODUCTION

This report presents data on how soon privately financed, nonsubsidized, unfurnished units in buildings with five or more units were rented (absorbed) after completion in 2015.<sup>1</sup> It is based on information collected in the Survey of Market Absorption of Multifamily Units (SOMA), which has been measuring market absorption for over forty years. Additional reports produced during the year include the Annual Characteristics report and four quarterly absorption reports.

The estimates in this report are based on a sample of approximately 4,100 buildings with 5 or more housing units. As with all surveys, estimates vary from actual value because of sampling variations or other factors. See the section on the *Accuracy of the Estimates*, at the end of this report, for more details.

## HIGHLIGHTS

- *NEW CONSTRUCTION – UNFURNISHED APARTMENTS:* In 2015, there were approximately 261,800 privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more completed in permit-issuing areas in the United States.<sup>2</sup> This is approximately 51,000 more rental apartments completed than in 2014, and represents the largest number of completions reported since 1988 (284,500). The highest number reported by SOMA of unfurnished rental apartment buildings with five or more units was in 1973, when 531,700 units were constructed. (Tables 1 and 9; Figure G).

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<sup>1</sup> Most of the estimates presented in this report are based on unfurnished rental units. Some estimates of absorption rates include both rented and sold units and are clearly labeled. Absorptions occurred between April 2015 and December 2016.

<sup>2</sup> About 98 percent of new construction of buildings with 5 or more units occurs in permit issuing areas. See Sample Design for more information.

- *ABSORPTION RATES (APARTMENTS)*: Sixty percent of the 261,800 privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more constructed in the United States in 2015 were absorbed (rented) within the first three months of completion. Eighty percent of the units were absorbed after 6 months, 91 percent absorbed after 9 months, and 96 percent absorbed after 12 months (Table 1; Figure H).

The National three-month absorption rates by rent categories, for units completed in 2015, ranged from 49 percent (\$2,450 or more) to 70 percent (\$850 - \$1,049). The 6-month absorption rates ranged from 69 percent (\$2,450 or more) to 89 percent (\$850 - \$1,049). The 9-month absorption rates ranged from 81 percent (\$2,450 or more) to 97 percent (\$850 - \$1,049). Twelve-month absorption rates for all rent categories were 90 percent or higher (Tables 2 and 3).

- *REGIONS*: The South led the nation in new nonsubsidized, unfurnished apartment rental completions accounting for 44 percent of the completions. The West was next with 27 percent, followed by the Midwest with 18 percent. The Northeast (11 percent) reported the least amount of new apartment rental construction in 2015. The 3-month absorptions rates for the Midwest (67 percent), the West (66 percent), and the Northeast (62 percent) did not differ significantly from each other. However, both the 3-month absorption rates for the Midwest and West were higher than the 53 percent absorbed in the South. There was no statistical difference detected in the 3-month absorption rates between the Northeast and the South. After six months, the South reported 75 percent of the units absorbed while the remaining regions reported absorption rates at 80 percent or higher. After nine months, the South reported 88 percent absorbed with the remaining regions reporting 90 percent or higher. After twelve months all of the regions reported absorption rates of 94 percent or higher (Table 1; Figure A).

- *METROPOLITAN AREAS:* The majority (97 percent) of new unfurnished rental apartments constructed in 2015 were built inside Core Based Statistical Areas (CBSA's). Fifty-seven percent of all unfurnished rental apartments were built inside principal cities of CBSA's and 40 percent were built outside principal cities (suburbs).<sup>3</sup> Of the 261,800 privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more, approximately three percent were built outside CBSA's. The three-month absorption rates ranged from 56 percent inside principal cities to 66 percent for those outside principal cities. Six-month, 9-month, and 12-month absorption rates for each area were 77 percent or higher (Table 1).
  
- *RENT:* The median asking rent for privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more completed in 2015, was \$1,396. This did not differ significantly from the \$1,386 median in 2014 (Table 2; Figure B).<sup>4</sup>

The highest median asking rent for units constructed in 2015 was in the Northeast at \$1,896 per month while the lowest was in the Midwest at \$1,062 per month. The median asking rent in the West was \$1,596 per month and the South had a median asking rent of \$1,373 per month (Table 2; Figure B).

Median asking rents in 2015 ranged from \$1,296 for a one bedroom unit to \$1,548 for units with 3 bedrooms or more (Table 3).

*NUMBER OF BEDROOMS:* Of the 261,800 units constructed in 2015, one-bedroom units accounted for 45 percent of the new units. This figure did not differ significantly from 41 percent built for two-bedroom units. Units with three or more bedrooms (8 percent) did not differ significantly from the 6 percent of efficiency or no bedroom units (Table 3; Figure C). There were no significant differences

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<sup>3</sup> The term "core based statistical area" (CBSA) became effective in 2000 and refers collectively to metropolitan and micropolitan statistical areas.

<sup>4</sup> The figure shown for the 2014 median has been adjusted to reflect inflation using calculations from the Bureau of Labor Statistics (C.P.I.). The Median Asking Rent, as reported in the 2014 publication, was \$1,384.

detected between absorption rates for efficiency, one, two, or three or more bedroom units by region within each of the 3, 6, 9, or 12-month absorption periods (Table 3).

- *NUMBER OF FLOORS:* Thirty-nine percent of the 261,800 privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more constructed in 2015 were built with three floors. The second highest percentage were units in buildings with four or five floors accounting for 29 percent of all rental apartment units. There were no significant differences detected in units in buildings with six or more floors (17 percent) and units in buildings with one or two floors (14 percent) (Table 4).

After three months, the absorption rates for all privately financed, nonsubsidized, unfurnished, rental apartments in buildings of five units or more constructed in 2015 by number of floors ranged from 51 percent in buildings with 6 or more floors to 65 percent for buildings with 1 or 2 floors. The six-month absorptions ranged from 71 percent in buildings with 6 or more floors to 84 percent for buildings with 1 or 2 floors. The nine-month absorption rates ranged from 85 in buildings with 6 or more floors to 93 percent for buildings with 1 or 2 floors. After 12 months, absorption rates by number of floors ranged from 93 in buildings with 6 or more floors to 98 percent for buildings with 1 or 2 floors (Table 4).

- *UTILITIES:* Of the 261,800 newly built unfurnished rental apartments, 21 percent included water and 25 percent included sewer with their rent, while the cost for electricity was included in 4 percent of the units. Gas was available in 48 percent of the units but only 11 percent reported it included in their rent.

Approximately 90 percent of all the units had laundry connections, 7 percent had shared facilities, and 3 percent provided both in-unit and shared facilities. Of the units with laundry connections, 91 percent provided a washer and dryer in the unit (Table 5a Figure D).

- *AMENITIES:* Ninety-eight percent of the units had access to Wi-Fi (or Internet), and 98 percent had access to Cable (or Satellite). However only 12 percent reported their Wi-Fi (or Internet) was included in their monthly payment, while 6 percent reported Cable (or Satellite) included in their monthly rent. Parking was available to 83 percent of the units and was included with rent in 75 percent of those units. Of the 221,400 units with swimming pools, about 85 percent had access at no additional cost (Table 5b; Figure E).
  
- *CONDOMINIUMS AND COOPERATIVE UNITS:* There were approximately 11,400 condominium and cooperative units constructed in 2015. This is the highest figure since 2011, when 11,300 units were constructed (Table 6). In 1974, SOMA reported 159,000 condominium and cooperative completions. (Table 9; Figure I). Of the 11,400 units constructed, approximately 11,300 were reported as condominium units (Table 7).

An estimated 100 percent of the condominium and cooperative units constructed in 2015 were completed inside Core Based Statistical Areas (CBSA's). Sixty-five percent were built inside principal cities and 35 percent were constructed outside principal cities (Table 6; Figure J).

- *CONDOMINIUM ASKING PRICE:* The median asking price for all condominium apartments built in 2015 was \$461,100 and did not differ significantly from the median asking price in 2014, \$389,600.<sup>5</sup> Twenty-three percent of the 11,300 condominiums sold had an asking price of more than \$700,000. This did not differ significantly from the 13 percent asking \$300,000 to \$349,999 but was higher than all of the remaining ranges. Approximately 80 percent of all new condominiums built in 2015 had two or more bedrooms. Approximately two percent of the new condominiums were efficiencies with no bedroom (Table 7).

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<sup>5</sup> The figure shown for the 2014 median has been adjusted to reflect inflation using calculations from the Bureau of Labor Statistics (C.P.I). The Median Asking Price, as reported in the 2014 publication, was \$389,100

- *ABSORPTION RATES (CONDOMINIUMS)*: Of the 11,300 condominium units built in 2015, 64 percent were sold (absorbed) within three months. After 6 months, 82 percent were absorbed; after 9 months 90 percent were absorbed; and by the end of 12 months, 95 percent of the units were absorbed (Table 7).
- *CONDOMINIUMS BY REGIONS*: Of the 11,300 condominiums completed in 2015, there were no significant differences discovered in the percent of completions between the Northeast (37 percent), South (27 percent) and West (29 percent) regions. However, all three were higher than the 7 percent reported in the Midwest. Three-month absorption rates ranged from 48 percent in the Northeast to 83 percent in the West. Six-month absorption rates ranged from 70 percent in the Northeast to 93 percent in the West. Nine-month absorption rates ranged from 79 percent in the Northeast to 98 percent in the South. The 12-month absorption rates ranged from 89 percent in the Northeast to 99 percent in the South (Table 7; Figure A).
- *CONDOMINIUMS BY GEOGRAPHICAL AREA*: An estimated one hundred percent of the new condominium units built in 2015 were completed inside CBSAs. Of those units, 66 percent were built inside principal cities and 34 percent were built outside principal cities. There were no significant differences detected between the 3-month absorption rates for condominiums built inside principal cities of CBSA's (68 percent), and those built outside principal cities of CBSA's (56 percent). The same was true for the 12-month absorption rates for condominiums built inside principal cities of CBSA's (98 percent) and those built outside principal cities of CBSA's (88 percent). However, the 6-month absorption rate for condominiums built inside principal cities (89 percent) exceeded that of the 6-month absorption rate of 68 percent reported for units outside principal cities. Additionally, the 9-month absorption rate for condominiums built inside principal cities (96 percent) was higher than that of the 78 percent reported for units outside principal cities (Table 7).

- *FURNISHED APARTMENT UNITS:* In 2015, there were approximately 6,800 furnished rental units in privately financed, nonsubsidized, rental apartments in buildings of five units or more constructed. There was no significant difference detected in the 6,800 units and the 7,900 units built in 2014. When SOMA began interviewing the absorption rates for of units in privately financed, nonsubsidized, rental apartments in buildings of five units or more in 1970, there were 48,200 furnished apartments (Table 9).

In 2015, units with two or fewer bedrooms accounted for approximately 5,100 of the furnished rentals. The median asking rent for a furnished unit was \$1,712. This figure did not differ significantly from the median asking rent of \$1,500 for a furnished unit in 2014.<sup>6</sup> After three months, 65 percent of the units were absorbed. Eighty-seven percent were absorbed after 6 months, and 93 percent were absorbed after nine months. By the end of 12 months 96 percent were absorbed (Table 8).

- *NEW CONSTRUCTION:* In 2015, there were approximately 310,300 apartments of all types constructed in buildings of five or more units. This is the highest number reported by SOMA since 2000, when 300,000 units were constructed. In 1973, SOMA reported there were approximately 774,800 apartments completed. This is the largest number of completions of all types of building with five or more units constructed during the SOMA survey era (Table 9; Figure F).
- *TOTAL CONSTRUCTION DISTRIBUTION:* Eighty-four percent of all 2015 completions were offered as nonsubsidized, unfurnished rental apartments; nine percent were reported as being subsidized and/or tax credit units; four percent were condominiums and cooperatives; two percent were furnished rental units; and less than one half of one percent were not in the scope of the survey (Table 9).<sup>7</sup>

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<sup>6</sup> The figure shown for the 2014 median has been adjusted to reflect inflation using calculations from the Bureau of Labor Statistics (C.P.I). The median rent for a furnished units, as reported in the 2014 publication, was \$1,498.

<sup>7</sup> Examples of out of scope units include group quarters, dormitories, retirement homes, nursing homes.



- *HOUSING UNITS FOR THOSE 55 YEARS AND OLDER:* In 2015 approximately 13,700 (five percent of the total unfurnished units construction in buildings of five or more units) were designated for persons 55 or older. Of those units, 96 percent provided varying types of assistance. Forty-nine percent of the units included meals with their rent and 49 percent included transportation with their rent. Other amenities paid for in their rent included housekeeping (40 percent), financial assistance (28 percent), and personal care (43 percent) (Table 10).
  
- *SUBSIDIZED UNITS:* There were approximately 29,200 units reporting some form of Federal Government Housing Subsidy in 2015.<sup>8</sup> This represents nine percent of the total units in buildings constructed with five or more units. Of the 29,200 units, 66 percent reported receiving assistance from the Low Income Housing Tax Credit (LHITC) program. Thirty-seven percent participated in the Section 8 program (Table 11; Figure K).

## CHARACTERISTICS OF THE DATA

All statistics from the SOMA refer to apartments in newly constructed buildings with five units or more. Absorption rates reflect the first time an apartment is rented or the first time a condominium or cooperative apartment is sold after completion. If apartments initially intended to be sold as condominium or cooperative units are, instead, offered by the builder or building owner for rent, they are counted as rental apartments. Units categorized as subsidized and tax credit are those built under two Department of Housing and Urban Development programs (Section 8, Low Income Housing Assistance and Section 202, Senior Citizens Housing Direct Loans) and all units in buildings containing apartments in the Federal Housing Administration (FHA) rent

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<sup>8</sup> Respondents were instructed to select **all** subsidies that applied to the building.

supplement program. The data on privately financed units include privately owned housing subsidized by state and local governments. Time-share units, continuing-care retirement units, and turnkey units (privately built for and sold to local public housing authorities after completion) are outside the scope of the survey.

Tables 1 through 5b are restricted to privately financed, nonsubsidized, unfurnished rental apartments. Table 6 is restricted to privately financed, nonsubsidized condominium and cooperative apartments, while Table 7 is limited to privately financed, nonsubsidized condominium apartments only. Table 8 covers privately financed, nonsubsidized, furnished rental apartments. Table 9 is a historical summary of the totals for all types of newly constructed apartments in buildings with five units or more. Table 10 reports on senior housing units and Table 11 covers subsidized housing and other FHA programs.

In April of 2014, the Survey of Market Absorption of New Multifamily Units (SOMA) began using interviewing software on laptop computers to collect data for January 2014 completions. At the same time, we revised the Asking Rent and Selling cost ranges for residential buildings containing five or more units, and modified items associated with the utilities and building amenities

## **NOTE TO DATA USERS**

The SOMA adopted new ratio estimation procedures in 1990 to derive more accurate estimates of completions.<sup>9</sup> This new procedure was used for the first time in processing annual data for 1990. Please use caution when comparing the number of completions in 1990 and following years with those in earlier years.

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<sup>9</sup> See ESTIMATION section below.

## **SAMPLE DESIGN**

The U.S. Census Bureau designed the survey to provide data concerning the rate at which privately financed, nonsubsidized, unfurnished units in buildings with five or more units are rented or sold (absorbed). In addition, the survey collects data on characteristics such as number of bedrooms, asking rent, and asking price.

Buildings for the survey came from those included in the Census Bureau's Survey of Construction (SOC).<sup>10</sup> For the SOC, the United States is first divided into primary sampling units (PSUs), which are stratified based on population and building permits. The PSUs to be used for the survey are then randomly selected from each stratum. Next, a sample of geographic locations that issue permits is chosen within each of the selected PSUs. Finally, all newly constructed buildings with five units or more within sampled places and a subsample of buildings with one to four units are included in the SOC.

For the SOMA, the Census Bureau selects, each quarter, a sample of buildings with five or more units that have been reported in the SOC sample as having been completed during that quarter. The SOMA does not include buildings in areas that do not issue permits. In each of the subsequent four quarters, the proportion of units in the quarterly sample that were sold or rented ("absorbed") are recorded, providing data for absorption rates 3, 6, 9, and 12 months after completion.

## **ESTIMATION**

Beginning with data on completions in the fourth quarter of 1990 (which formed the basis for absorptions in the first quarter of 1991), the Census Bureau modified the estimation procedure and applied the new estimation procedure to data for the other three quarters of 1990 so that annual estimates using the same methodology for four quarters could be derived. The Census Bureau did not perform any additional re-estimation of past data.

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<sup>10</sup> See <http://www.census.gov/const/www/newresconstdoc.html#sample> for further details on the SOC sample design.

Using the original estimation procedure, the Census Bureau created design-unbiased quarterly estimates by multiplying the counts for each building by its base weight (the inverse of its probability of selection) and then summing over all buildings. Multiplying the design-unbiased estimate by the following ratio-estimate factor for the country as a whole provides the final estimate:

*“total units in buildings with five units or more in permit-issuing areas as estimated by the SOC for that quarter **divided by** total units in buildings with five units or more as estimated by the SOMA for that quarter.”*<sup>11</sup>

In the modified estimation procedure, instead of applying a single ratio-estimate factor for the entire country, the Census Bureau computes separate ratio-estimate factors for each of the four census regions. Multiplying the unbiased regional estimates by the corresponding ratio-estimate factors provides the final estimates for regions. The Census Bureau obtains the final estimate for the country by summing the final regional estimates.

This procedure produces estimates of the units completed in a given quarter that are consistent with published figures from the SOC and reduces, to some extent, the sampling variability of the estimates of totals. Annual absorption rates are obtained by computing a weighted average of the four quarterly estimates.

Absorption rates and other characteristics of units not included in the interviewed group or not accounted for are assumed to be identical to rates for units about which data were obtained. The noninterviewed and not-accounted-for cases constitute less than two percent of the sample housing units in this survey.

A survey interview is complete once the Field Representative collects information for the bedrooms. SOMA does not collect the characteristics for subsidized units, therefore, if any unit that is a Section 8 or receives any government assistance the interview is then complete.

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<sup>11</sup> Beginning with January 2001 completions, the SOC revised its methodology for estimating the number of units completed for 5+ multi-unit structures. See [http://www.census.gov/const/www/new\\_methodology\\_const.html](http://www.census.gov/const/www/new_methodology_const.html) for these changes. Thus, caution is advised when comparing data from 2001 and forward to any estimates prior to 2001

An interview is considered a sufficient partial interview when at least the building type (Unfurnished Rental, Furnished Rental, Cooperative, Condominium, or Owned or Leased by a Public Housing Agency) is recorded.

The response rates for SOMA are calculated by dividing the number of building interviews by the number of eligible buildings:

$$\frac{\text{Interviews}}{\text{Interviews plus Type A's (e.g. refusals)}} \times 100$$

Out of Scope cases (i.e., dormitories, townhouses, group quarters, timeshare, continuing-care, and retirement unit) are excluded in this calculation.

Sample Sizes and Weighted Response Rates by Quarter of Completion in 2015:

2015 Completions	Eligible		Ineligible	Weighted Response Rate
	Interviews	Non-interviews		
First Quarter	794	5	15	99.5
Second Quarter	966	11	21	99.5
Third Quarter	1,200	14	19	99.3
Fourth Quarter	1,004	20	23	98.8
Total	3,964	50	78	99.3

## ACCURACY OF THE ESTIMATES

The SOMA is a sample survey and consequently all statistics in this report are subject to sampling variability. Estimates derived from different samples would differ from one another. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples. The methodology for calculating standard errors is explained in the section on sampling errors.

Two types of possible errors are associated with data from sample surveys: nonsampling and sampling errors.

## **Nonsampling Errors**

In general, nonsampling errors can be attributed to many sources: inability to obtain information about all cases in the sample, difficulties with definitions, differences in interpretation of questions, inability or unwillingness of the respondents to provide correct information, and errors made in processing the data. Although no direct measurements of the biases have been obtained, the Census Bureau thinks that most of the important response and operational errors were detected during review of the data for reasonableness and consistency.

## **Sampling Errors**

The particular sample used for this survey is one of many possible samples of the same size that could have been selected using the same design. Even if the same questionnaires, instructions, and interviewers were used, estimates from each of the different samples would likely differ from each other. The deviation of a sample estimate from the average from all possible samples is defined as the sampling error. The standard error of a survey estimate provides a measure of this variation and, thus, is a measure of the precision with which an estimate from a sample approximates the average result from all possible samples.

As calculated for this survey, the standard error also partially measures the variation in the estimates due to errors in responses and by the interviewers (nonsampling errors), but it does not measure, as such, any systematic biases in the data. Therefore, the accuracy of the estimates depends on the standard error, biases, and some additional nonsampling errors not measured by the standard error. As a result, confidence intervals around estimates based on this sample reflect only a portion of the uncertainty that actually exists. Nonetheless, such

intervals are extremely useful because they capture all of the effect of sampling error and, in this case, some nonsampling error as well.

If all possible samples were selected, if each of them was surveyed under the same general conditions, if there were no systematic biases, and if an estimate and its estimated standard error were calculated from each sample, then:

Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate (i.e., the 68-percent confidence interval) would include the average result from all possible samples.

Approximately 90 percent of the intervals from 1.645 standard errors below the estimate to 1.645 standard errors above the estimate (i.e., the 90-percent confidence interval) would include the average result from all possible samples.

Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate (i.e., the 95-percent confidence interval) would include the average result from all possible samples.

This report uses a 90-percent confidence level as its standard for statistical significance.

For very small estimates, the lower limit of the confidence interval may be negative. In this case, a better approximation to the true interval estimate can be achieved by restricting the interval estimate to positive values; that is, by changing the lower limit of the interval estimate to zero.

The reliability of an estimated absorption rate (i.e., a percentage) computed by using sample data for both the numerator and denominator depends on both the size of the rate and the size of the total on which the rate is based. Estimated rates of this kind are relatively more reliable than the corresponding estimates of the numerators of the rates, particularly if the rates are 50 percent or more.

Tables A, B, and C present approximations to the standard errors of various estimates shown in the report. Table A presents standard errors for estimated totals, Table B presents standard errors of estimated percentages for all units, and furnished and unfurnished apartments, and

Table C presents standard errors of estimated percentages for condominiums and cooperatives. To derive standard errors that would be applicable to a wide variety of items and could be prepared at moderate cost, a number of approximations were required. As a result, the tables of standard errors provide an indication of the order of magnitude of the standard errors rather than the precise standard error for any specific item. Standard errors for values not shown in Tables A or B can be obtained by linear interpolation.

### **ILLUSTRATIVE USE OF THE STANDARD ERROR TABLES**

Table 2 of this report shows that there were 114,900 privately financed, nonsubsidized, unfurnished units in buildings with five or more units constructed in the South in 2015. Using Table A, Test A-1 shows the standard error of an estimate of 114,900 to be approximately 5,572. To obtain a 90-percent confidence interval, multiply 5,572 by 1.645 (yielding 9,165), and add and subtract the result from 114,900, yielding limits of 105,735 and 124,065. The true number of units may or may not be included in this computed interval, but one can say that through repeated sampling, 90 percent the constructed intervals contain the true number of units.

Table 2 also shows that the rate of absorption after 9 months for those 114,900 units was 88 percent. Using Table B, Test B-1 shows the standard error on an 88 percent rate on a base of 114,900 to be approximately 2.0 percent. Multiply 2.0 by 1.645 (yielding 3.3), and add and subtract the result from 88. The 90-percent confidence interval for the absorption rate of 88 percent is from 84.7 percent to 91.3 percent.

The median asking rent for these 114,900 unfurnished rental apartments built in the 2014 was \$1,373. The standard error of this median is about \$35.

Several statistics are needed to calculate the standard error of a median.

- The base of the median--the estimated number of units for which the median has been calculated--in this example, **BASE = 114,900**.



- The estimated standard error from Table B-1 of a 50-percent characteristic on the base of the median ( $\sigma_{50\%}$ ). In this example, Test B-2, the estimated standard error of a 50-percent characteristic with the base of 114,900 is about 3.1 percent ( **$\sigma_{50\%} = 0.031$** ).
- The length of the interval that contains the median. In this example, the median lies between \$1,250 and \$1,449. **LENGTH = \$200.**
- The estimated number of units falling in the interval that contains the median--in this example, **UNITS = 20,600.**

The standard error of the median is obtained by using the following approximation:

$$\text{Standard error of median} = (\sigma_{50\%} \times \text{LENGTH}) / (\text{UNITS} / \text{BASE})$$

For this example, the standard error of the median of \$1,373 is:

$$(0.031 \times \$200) / (20,600/114,900) = \$35$$

Therefore, 1.645 standard error equals \$58 (\$35 x 1.645). Consequently, an approximate 90-percent confidence interval for the median asking rent of \$1,373 is between \$1,315 and \$1,431 (\$1,373 plus or minus \$58).